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Predicting What Mothers Feed Their Preschoolers: Guided by an Extended Theory of Planned Behaviour

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## Abstract

**Background:** Healthy eating behaviours are important for physical and mental well-being and developing healthy eating behaviours early in life is important. As parents are the main providers of preschool children's food the main objective of this study was to use the theory of planned behaviour, expanded to include habit and past behaviour, to predict parents' healthy feeding intention and behaviour. **Methods:** Theory of planned behaviour, habit strength, and past behaviour were reported at baseline by 443 mothers. One week later, 235 mothers completed a healthy feeding questionnaire on the eating behaviours of their 2 to 4 year old child. Data were analysed using hierarchical regression analyses to predict parent's general healthy feeding behaviour, and five sub-behaviours: parents' perceptions of their child's fruit and vegetable consumption, healthy and unhealthy snacking behaviour, as well as healthy and unhealthy drinking behaviour. **Results:** Intention, perceived behavioural control, habit strength and past behaviour were all positively associated with parents' general healthy feeding (47% explained variance). Perceived behavioural control was the only variable positively associated with mothers' perception of their child's fruit and vegetable consumption and unhealthy snacking behaviour. The theory did not explain the other behaviours. Moreover, habit strength only strengthened the intention-behaviour link for fruit and vegetable consumption and child's age was only positively associated with the mothers' perception of their child's unhealthy snacking behaviour. **Discussion:** The findings suggest important differences in the predictors of different feeding behaviours that can provide direction for future intervention development.

*Keywords:* Healthy feeding intentions; extended theory of planned behaviour; habit strength; intention; sugar sweetened beverages, fruit and vegetable, snacking; preschoolers

## Introduction

Healthy eating behaviours are important in living a healthy life and reduces the chances for lifestyle related diseases (WHO, 2013). Lifestyle related diseases, for example diabetes (Sanders, Han, Baker, & Cobley, 2015) and tooth decay (Arora et al., 2011), have been shown to develop early in life. Despite this, findings from the 2007 Australian National Children's Nutrition and Physical Activity Survey (Olds et al., 2007) show that most Australian preschoolers do not meet nutrition guidelines (National Health and Medical Research Council, 2013). Only 5% of Australian preschoolers consume between 2 and 4 servings of vegetables daily, more than 80% exceed sugar recommendations (including sugar sweetened drinks and high sugar breakfast cereals), and only 50% meet the guidelines for water consumption. In more recent Australian surveys, 96% of preschoolers exceeded recommendations for fat intake (Chai et al., 2016) and only 5% met recommendations for vegetable consumption (Mihirshahi et al., 2019). As diet and health of preschoolers have been shown to track into later childhood (Simmonds, Llewellyn, Owen, & Woolacott, 2016), it is imperative that effective dietary interventions are implemented to improve healthy eating practices at a young age. Early interventions that promote health behaviours may be more successful than those initiated later (Birch & Ventura, 2009).

In the first five years of life, children learn a great deal about food and eating, and rapidly develop their food preferences and behavioural patterns, which are consolidated in later childhood (Savage, Fisher, & Birch, 2007). Food preferences measured at 2-3 years old have been demonstrated prospectively to remain stable into young adulthood (Nicklaus, Boggio, Chabanet, & Issanchou, 2004). In this age group, parents and caregivers often have control over children's exposure to certain foods, the frequency and size of meals/snacks, as well as the social and learning contexts in which food is eaten (Birch & Ventura, 2009). As such, parents and caregivers play an important role in healthy eating behaviours of preschool children. The focus of interventions for young children, therefore, should be on influencing the feeding behaviours of parents and other primary caregivers for their young children.

Before effective interventions can be designed, formative research is needed to identify the key predictors of parents' decision making for healthy feeding practices. Previous studies that have investigated parents' feeding behaviours of preschoolers mostly focused on associating parent characteristics to parents' feeding behaviours (e.g., Kröller & Warschburger, 2008; McCurdy, Gorman, Kisler, & Metallinos-Katsaras, 2014; McCurdy, Gorman, & Metallinos - Katsaras, 2010; Warkentin, Mais, de Oliveira, Carnell, & de Aguiar CarrazedoTaddei, 2018). These studies found that parents' education, BMI and mental health (i.e., maternal depression) were associated with healthy feeding practices in preschoolers. Less is known about what psychosocial factors predict parents' healthy feeding behaviours of preschoolers. Given that intention seems to be the main predictor of parents behaviours regarding their young children's health (Hamilton, Daniels, White, Murray, & Walsh, 2011; Hamilton, Kothe, Mullan, & Spinks, 2017), it is likely that intention is an important predictor of parents' healthy feeding behaviours of preschoolers.

According to the theory of planned behaviour (Ajzen, 1991), intention is the strongest predictor of health-related behaviours, with attitude, subjective norm, and perceived behavioural control theorised to predict intention. Perceived behavioural control is seen as a direct predictor of behaviour. The theory of planned behaviour has been used extensively to predict health behaviours (Rich, Brandes, Mullan, & Hagger, 2015), including behaviours of mothers toward healthy eating in young (children aged 2-3 years; Spinks, 2013; Spinks & Hamilton, 2015) and very young children (6+ months; Hamilton et al., 2017). This makes the theory of planned behaviour a useful framework to adopt as a starting point in better understanding parents' behaviours regarding their preschooler's healthy eating practices.

However, the theory is not without its shortcomings and many people fail, for various reasons such as competing demands and distractions, to enact their intentions (Sniehotta, Pesseau, & Araújo-Soares, 2014). Other variables, therefore, may be important to consider to better to explain the extent to which parents are able to enact their intended feeding behaviours for their preschool aged children. Previous studies that investigated healthy eating behaviour with the theory of planned behaviour have shown past behaviour to be a

strong predictor of future behaviour (Collins & Mullan, 2011; Wong & Mullan, 2009). Given the pervasive effects of past behaviour on key constructs of psychological theories and their relations with health behaviours (Kor & Mullan, 2011; Norman, Conner, & Bell, 2000), including past behaviour in the model may be important to consider as behaviour is stable over time, thus past behaviour summarises all unknown but persistent influences on behaviour.

Habit strength may be another important variable to consider in predicting healthy feeding behaviour. Habitual behaviours are those that are initiated automatically upon encountering environmental cues, due to the activation of learned cue-behaviour associations (Gardner, 2015). While correlated, past behaviour and habit strength have been shown to individually explain additional variance in behaviour (Ouellette & Wood, 1998) and, thus, both are likely to be important in predicting healthy feeding behaviour. Studies have shown that habit strength predicts individuals' capacity to enact their intentions (Allom, Mullan, Clifford, & Rebar, 2018; Verhoeven, Adriaanse, Evers, & de Ridder, 2012). In the context of this study, it may be that parents have established habitual healthy feeding patterns that facilitate the enactment of healthy feeding intentions, or habitual unhealthy patterns that block them. Thus, habit strength should have a direct effect on parents' feeding behaviours for their preschool aged children.

Research has also shown habit strength to moderate the intention-behaviour relationship. According to Mullan and Novoradovskaya (2018) this may be especially the case in more complex behaviours. They suggest that complexity is a combination of two factors: number of steps (e.g. onestep versus multistep) and outcome of the behaviour (e.g. instant hedonic versus distal benefit behaviours). According to this classification, parents' healthy feeding behaviour could be considered as a complex as it is multi-step behaviour and has distal benefits. Therefore, it is likely that habit strength moderates the intention-behaviour association. The general healthy feeding behaviours of parents for their preschool age children include a set of sub-behaviours; for example, fruit and vegetable consumption, snacking behaviours, and drinking behaviours. Snacking and drinking behaviours could be considered 'less' complex behaviours. Habit strength, therefore, should not

moderate the intention-behaviour association when predicting these behaviours. The role of habit may be more important in predicting fruit and vegetable consumption, as this behaviour may be considered ‘complex’. This is because getting a preschooler to eat fruits and vegetables involves multiple small linked actions and multiple sequences of behaviours (e.g., knowledge of what fruits and vegetables to buy, ability and confidence to prepare and/or cook the fruits and vegetable; Mullan and Novoradovskaya (2018)). This theorising was supported in a study by De Bruijn (2010), who found both direct and indirect effects of habit and intention on fruit and vegetable consumption, and by the ‘environmental research for weight gain prevention (EnRG) framework’ which suggests that habit is likely to moderate the intention-behaviour relationship (Kremers et al., 2006). Classifying behaviour into different categories of complexity may help to understand the importance of habit strength in predicting parents’ healthy feeding behaviours of preschoolers.

### **The Current Study**

Based on this literature, the main objective of the current study was to use the theory of planned behaviour with the addition of past-behaviour and habit strength to predict parental feeding behaviour for their preschoolers. Parents of children aged 2 to 4 years were included in the study as these children are more influenced by parents’ feeding decisions than at other ages. Because the children develop quickly within this age range (Birch & Fisher, 1998), we controlled for child’s age. Besides parents’ general healthy feeding behaviour, which we considered is what was offered by the parent, more specific behaviours were evaluated to explore the role of habit strength on behaviours with different complexities. These sub-behaviours were parents’ perception of their child’s fruit and vegetable consumption, healthy and unhealthy snacking behaviour as well as healthy and unhealthy drinking behaviour.

It was hypothesised that for all behaviours (general feeding behaviour, fruit and vegetable consumption, healthy and unhealthy snacking, and healthy and unhealthy drinking) attitude, subjective norm, and perceived behavioural control would predict intention, and intention and perceived behavioural control would predict behaviour. It was further hypothesised that past behaviour and habit strength would predict



behaviour and explain additional unique variance over and above the theory of planned behaviour constructs. Lastly, it was hypothesised that habit strength would moderate the relationship between intention and behaviour for the more complex parental behaviours of general feeding behaviour and fruit and vegetable consumption, and would not moderate the intention-behaviour relationship for the more simple behaviours of healthy and unhealthy snacking and drinking. Specifically, it was expected that for the two more complex behaviours, individuals with strong habit strength would be more likely to engage in the behaviours regardless of intention. This is in contrast to those with low habit strength, who would need a high intention in order to perform the behaviours.

## **Methods**

### **Study Design**

Ethics approval was granted by Curtin University Human Research Ethics Committee. A prospective survey design was used and included two time points, one week apart, to predict behaviours in the week that passed between time 1 and time 2. The predictor variables (attitude, subjective norm, perceived behavioural control, intention, habit strength, and past behaviour of parents' general healthy feeding) were measured at baseline (time 1). Outcome variables (parents' general healthy feeding behaviour, their perception of their child's fruit and vegetable consumption, snacking as well as drinking behaviours over the last week) were measured one week later (time 2). The two time points were necessary to use past-behaviour as a predictor variable of the same behaviour assessed over the one-week follow-up period.

### **Participants**

Australian parents were conveniently sampled on Facebook in different open and closed parenting and food focussed Facebook groups from June to August 2017. The inclusion criteria for participation was they had to have at least one child in the age range between 2 and 4 years. They were asked to participate in a study on beliefs about their healthy feeding practices for their preschool aged children. Participants were also informed that the information from the study would be used to help develop an online healthy eating

intervention for parents of preschool children. Using a secure link, participants were taken to the study information sheet and consent form and, after providing consent, were then taken to the main survey presented using the Qualtrics™ online survey tool. Seven hundred-and-two parents clicked on the link of which 443 completed the actual survey, all of whom were mothers. The remainder chose not to complete the survey for reasons unknown. One week after completing the main survey, an email containing a link to the follow-up survey was sent to all 443 mothers. At one week follow-up, 235 mothers completed the second survey ( $M_{\text{age}} = 33.6$ ,  $SD = 4.39$ , range: 23, 56). The average BMI of mothers in our sample was 26.8 ( $SD = 5.72$ , range = 17.7 – 50.6) and slightly positively skewed, Skewness,  $z = 1.40$  ( $SE = .160$ ), Kurtosis,  $z = 2.72$  ( $SE = .320$ ). Although we did not intend to only sample mothers, we were unsuccessful in obtaining complete data of fathers. The descriptive statistics of our sample is compared in Table 1 to the general Australian population data (Australian Bureau of Statistics, 2018), which is data based on females aged between 24 and 64 years. Table 1.

Samples' Descriptive Statistics Compared to General Australian Female Population Data

	Our sample	General Australian female population data
Occupation		
Part-time employment	36%	39%
Full-time employment	20%	33%
Casually employed	8%	19%
Full-time parent or carer	25%	9%
Studying	5%	33%
Maternity leave	6%	N.A.
Education		
Completed high school	12%	38%
Bachelor or certificate 3	54%	54%
Post-graduate degree	34%	14%
Living situation		
Partnership and living together	97%	92%

Table 1 shows that our sample is representative of the general Australian female population in regards of the proportion working in part-time or full-time employment as well as having a bachelor's degree.

However, participants in our sample were more likely to have a post-graduate degree, more likely to be a full-time parent, and less likely to be a student. It should be noted that this data is drawn from general population-based data of Australian females aged 24-64 years and not limited to mothers of preschoolers.

Most mothers in our sample had two children ( $M = 1.94$ ,  $SD = 1.03$ , range 1 – 7). All mothers reported the gender and age of all their children, the gender and age reported here is of the oldest child within the 2 to 4 year age range. Approximately half of these children were female (52%), 35% were 3 years old, 33% 2 years old, and 32% 4 years old. Most had no siblings (41%) or only one (37%), and of those who had siblings, 27% had siblings older than 4 years old.

### **Procedure**

The time 1 survey started with information about the study, then an informed consent form followed by the eligibility question (“Are you a parent or a primary carer of a child aged 2-4 years old?”). Next, the theory of planned behaviour measures were presented in the following order: perceived behavioural control, attitude, intention, and subjective norm. These were followed by the habit strength index and the past behaviour measure. The time 2 survey link was emailed to participants one week following time 1 survey completion and consisted of behavioural questions regarding parents’ general healthy feeding behaviour, their perceptions of their child’s fruit and vegetable consumption, healthy and unhealthy snacking as well as healthy and unhealthy drinking behaviour.

### **Measures**

#### **Theory of Planned Behaviour Measures**

Multi-item psychometric measures of intention (two items), attitude (seven items), subjective norms (two items), and perceived behavioural control (three items) with respect to parents’ general healthy feeding behaviour were developed based on Ajzen’s guidelines (Ajzen, 2006).

The 7-item **attitude** subscale was used to measure attitudes towards parents’ healthy feeding practices. All items started with the stem: “For me, ensuring that my child eats healthily every day over the next week

would be...” and were followed with 7-point semantic differential from 1-7 (e.g., “unenjoyable – enjoyable”). Mean scores were calculated and higher scores indicated positive attitudes towards healthy feeding. The internal reliability was good,  $\alpha = .84$ .

Using the 2-item **subjective norm** subscale, parents’ normative beliefs about other people’s expectations were measured (e.g., “Most people who are like me think that I should ensure that my child eats healthily every day”) on a 7-point Likert scale (1 = *Strongly disagree* to 7 = *Strongly Agree*). Mean scores were calculated and higher scores indicate more positive norms towards their child’s healthy eating. The internal reliability was acceptable,  $\alpha = .69$ .

A 3-item scale was used to measure **perceived behavioural control** over adhering to feeding their preschooler a healthy diet (e.g. “I am confident I can get my child to eat healthily every day over the next week”) on a 7-point Likert scale (1 = *Strongly disagree* to 7 = *Strongly agree*). As internal reliability increased from  $\alpha = .69$  to  $\alpha = .84$  if the item: “It is completely up to me whether or not I ensure that my child eats healthily every day over the next week” was removed, this item was excluded from final analyses. Mean scores were calculated and higher scores indicated stronger perceived behavioural control.

A 2-item intention subscale was used to measure parents’ **intention** to feed their preschooler a healthy diet (e.g. “I intend to ensure my child eats healthily every day over the next week”) on a 7-point Likert scale (1 = *Strongly disagree* to 7 = *Strongly agree*). Mean scores were calculated and higher scores indicated stronger intentions. The internal reliability was good,  $\alpha = .80$ .

### **Habit strength**

The Self-Report Habit Index is a 12-item measure (Verplanken & Orbell, 2003) and was used to assess the strength of mothers’ feeding habits for their young children at time 1. Participants indicated their agreement with items such as “Ensuring that my child eats healthily is something I do automatically” on a 7-point Likert Scale (1 = Strongly disagree, to 7 = Strongly agree). Mean scores were calculated and higher scores reflecting

stronger habit strength. The internal validity score was excellent (time 1:  $\alpha = .93$ ). The habit strength measured at time 1 was used as predictor variable in the following analyses.

### **Behaviour Measures**

All behavioural measures assess health-related behaviours on a continuum with a higher score reflecting a healthier behaviour and a lower score reflecting an unhealthier behaviour. Healthiness was defined according to the Dietary Guidelines for Children and Adolescents in Australia encouraged by the Australian Department of Health (National Health and Medical Research Council, 2013) and by the Better Health Channel (2012). These guidelines deem food and drinks to be ‘unhealthy’ where they are either energy-dense, or nutrient-poor. Further The Australian Guide to Healthy Eating is based around five core food groups with water and milk also considered core. Foods or beverages that do not fit into these groups are extra or ‘noncore’.

An average score for **past behaviour** was calculated at time 1 using two items, assessed on a 7-point Likert scale: “Last week, I ensured that my child ate healthily each day” (1 = *Strongly disagree*, 7 = *Strongly agree*) and “Last week, how frequently did you ensure that your child ate healthily?” (1 = *Never*, 7 = *Always*).

An average score for parents’ **general healthy feeding behaviour** was measured at time 2. This mean score consisted of the same two behavioural check questions as described above and five additional items that measured parental adherence to providing a healthy diet (e.g. “Last week I chose nutritious foods that met the energy needs of my child”) on a 7-point scale (1 = *Strongly disagree*, 7 = *Strongly Agree*).

Parents’ perceptions of their child’s **Fruit and vegetable consumption** was measured at time 2 with four items. Parents were reminded that fruits can be fresh, frozen, tinned (in own juice, not syrup) or dried and that a child’s portion of fruit is smaller than an adult’s. It was explained that a rough guide for a child’s portion is equivalent to the size of a child’s fist. The first item was: “Over the last week, how many servings of fruit did your child typically eat per day? Please include those eaten at mealtimes and as snacks” with six answer options (1 ‘*Less than 1 a day*’, 2 ‘*1 per day*’, 3 ‘*2 per day*’, 4 ‘*3 per day*’, 5 ‘*4 per day*’, and 6 ‘*5 or more per*

*day*). If participants answered option 1, it was followed with an open-ended question: “You have selected less than 1 per day, please state number of servings in the past week”. These questions were repeated for vegetable consumption, where the word *fruit* was replaced by the word *vegetable*. A mean fruit and vegetable consumption score was calculated, higher scores reflected higher amount of the child’s fruit and vegetable consumption as perceived by their parent.

Parents’ perceptions of their child’s **Healthy and unhealthy snacking and drinking behaviour** of the child was measured at time 2 using a previously validated measure (McGowan et al., 2013) consisting of 15 items. The items started with the stem: “How often did your child have the following as a snack/drink between or after meals last week?”. The 5 **healthy snack options** were: fruit, vegetables, other savoury snacks (e.g. oatcakes, rice cakes, breadsticks, etc.), dairy snacks (e.g., yoghurt, milk), and other dairy based snacks (e.g., cheese, cheese products). The 3 **unhealthy snack options** were sweets (e.g., chocolate, lollies), sweet snacks (e.g., biscuits, cakes, ice creams), and savoury snacks (e.g., chips, cheese biscuits). The 2 **healthy drink options** were: milk (skimmed, semi-skimmed or whole) and water. The 5 **unhealthy drink options** measured were: regular soft drinks (e.g., Coke, Sprite), diet soft drinks (e.g., Diet Coke), unsweetened juice (100% fruit juice), milk drinks (e.g., milkshakes, hot chocolate), and tea/coffee. Answer options were: 1 ‘*Never/rarely*’, 2 ‘*Once a week*’, 3 ‘*2-3 times last week*’, 4 ‘*4-6 times last week*’, 5 ‘*Once a day*’, 6 ‘*Twice a day*’, and 7 ‘*Three or more times a day*’. A mean of healthy and unhealthy snacking and drinking behaviour was calculated. Higher scores reflected higher intake of healthy snack and drink options and lower intake of unhealthy snack and drink options by the child as perceived by their parent.

### **Data Preparation and Statistical Analysis**

Data were collected via Qualtrics at two different time points. The predictor variables of the theory of planned behaviour and past behaviour were collected at time 1, habit strength and follow-up behaviour were collected at time 2. To test hypotheses, a linear regression was conducted to establish if attitude, subjective norm, and perceived behavioural control predicted intention. Next, hierarchical multiple regressions were

conducted wherein child age was entered as predictor at step 1. Intention and perceived behavioural control were entered as simultaneous predictors in the second step, habit strength and past behaviour in the third step, and a (z-standardised) interaction term representing the multiplicative product of intention x habit strength entered in the fourth step. The six outcome behaviours we initially planned to assess were: (1) general health behaviour; (2) fruit and vegetable consumption; (3) healthy snacking behaviour; (4) unhealthy snacking behaviour; (5) healthy drinking behaviour; and (6) unhealthy drinking behaviour.

### Results

Preliminary analysis revealed that the descriptive statistics correlated with none of the other variables, all  $r < -.121$ ,  $p > .065$ , therefore, these were not included in the models. Zero-order correlations for the variables included in the models are shown in Table 2. The predictor variables did not correlate with healthy snacking behaviour, healthy drinking behaviour, or with unhealthy drinking behaviour. Therefore, hierarchical analyses, which were planned to test whether intention, habit strength, and the interaction of intention and habit strength would predict these behaviours were omitted. Effects in the model that predicted intention were considered significant at  $p < .05$ . However, given that three models tested the predictions on the three outcome behaviours, Bonferroni correction was applied. Therefore, effects were considered significant when  $p < .017$ .

Prior to interpreting the results, several assumptions were evaluated. First, skewness and kurtosis measures indicated that each variable was normally distributed (skew  $Z < 1.63$ , and kurtosis  $Z < 3.30$ ). Furthermore, there were no extreme scores and multivariate outliers were not of concern given all Cook's distances were below 1. Additionally, the correlation matrix revealed that multicollinearity was not an issue ( $r < .661$ ). Lastly, the residuals were normally distributed, linear, and homoscedastic as shown by the standardised residual histograms, P-P plots, and scatterplots, respectively.

Table 2.

Means, Standard Deviations, and Zero-Order Correlations

	2	3	4	5	6	7	8	9	10	11	12	13
1. Child's age (T1)	-.057	-.095	.019	-.045	-.011	-.030	-.045	-.036	-.094	-.117**	-.117	-.050
2. Attitude (T1)	-	.189**	.657***	.442***	.558***	.446***	.514***	.319***	.099	.319***	.040	-.125
3. Subjective Norm (T1)		-	.147*	.207**	.228***	.169**	.145*	.118	.044	.090	-.004	.153*
4. PBC (T1)			-	.526***	.656***	.620***	.661***	.411***	.078	.368***	-.008	.155*
5. Intention (T1)				-	.587***	.545***	.517***	.253***	-.027	.269***	-.028	.075
6. Habit strength (T1)					-	.662***	.612***	.308***	.060	.381***	-.102	.176*
7. Past behaviour (T1)						-	.636***	.327***	.164*	.262***	-.024	.133*
8. General behaviour (T2)							-	.489***	.142*	.355***	-.027	.274***
9. FV behaviour (T2)								-	.179**	.257***	-.043	.130*
10. Healthy snacking behaviour (T2)									-	-.355***	.349***	.019
11. Unhealthy snacking behaviour (T2)										-	-.221**	.332***
12. Healthy Drinking behaviour (T2)											-	.034
13. Unhealthy drinking behaviour (T2)												-

*Note.* Child age represent the age of the oldest child in the 2 to 4 year age range.

*PBC*= perceived behavioural control; *FV* = fruit and vegetable.

*The predictor variables were measured at time 1 (T1), the behaviour variables were measured at time 2 (T2).*

\*  $p < .05$ . \*\*  $p < .010$  (2-tailed).



### **Descriptive Statistics of the Theory of Planned Behaviour Measures**

Given that child's age ranged from 2 to 4 and since child's age is a predictor variable in our analysis, we have provided separate descriptive statistics of the theory of behaviour measures from mothers with children of 2, 3, and 4 year old in the supplemental information and on <https://osf.io/xsych/>. One-way ANOVAs showed that only unhealthy snacking behaviour differed across child age groups,  $F(2,231) = 4.20, p = .016, \eta^2 = .035$ , all other  $F < 1.78, p > .170, \eta^2 < .015$ .

### **Predicting Intentions**

In line with the theory of planned behaviour, together, attitude ( $b = .150, t(234) = 2.04, p = .042$ ), subjective norm ( $b = .118, t(234) = 2.12, p = .035$ ), and perceived behavioural control ( $b = .411, t(234) = 5.65, p < .001$ ) significantly explained 30% of variance in intention, adjusted  $R^2 = .298, F(3, 231) = 34.1, p < .001, f^2 = .443$ . Unstandardised ( $B$ ), standardised ( $b$ ), and squared part correlations ( $sr^2$ ) for each predictor of the three different behaviours are reported in Table 4.

Table 3.

*Unstandardised (B) and Standardised (b) Regression Coefficients, and Squared Part-Correlations ( $sr^2$ ) for Each Predictor in a Regression Model Predicting Parents' Healthy Feeding Behaviours*

Variable	General Healthy Feeding Behaviour			Fruit and Vegetable Consumption			Unhealthy Snacking Behaviour		
	<i>B</i> (95% <i>CI</i> )	<i>b</i>	$sr^2$	<i>B</i> (95% <i>CI</i> )	<i>b</i>	$sr^2$	<i>B</i> (95% <i>CI</i> )	<i>b</i>	$sr^2$
Step 1									
Child's age	-.041(-.156, .075)	-.045	.002	-.040(-.186, .105)	-.036	.001	-.201(-.345, -.057)	-.177**	.031
Step 2									
Child's age	-.041(-.125, .043)	-.046	.002	-.047(-.180, .086)	-.041	.002	-.203(-.337, -.069)	-.180**	.032
Intention	.235(.122, .348)	.230***	.038	.056(-.123, .235)	.043	.001	.115(-.064, .295)	.089	.006
PBC	.307(.244, .370)	.541***	.210	.282(.183, .382)	.394***	.112	.233(.133, .333)	.325***	.076
Step 3									
Child's age	-.035(-.111, .042)	-.039	.002	-.043(-.177, .090)	-.038	.001	-.200(-.334, -.067)	-.177**	.031
Intention	.133(.024, .242)	.130**	.011	.011(-.182, .205)	.006	< .001	.070 (-.123, .264)	.054	.002
PBC	.199(.129, .270)	.351***	.062	.244(.125, .363)	.341***	.059	.189 (.070, .309)	.264**	.035
Habit strength	.095(.005, .185)	.133*	.009	< .001(-.152, .153)	< .001	< .001	.154 (.002, .306)	.170*	.014
Past behaviour	.222(.119, .325)	.273***	.036	.118(-.055, .291)	.006	.001	-.045 (-.219, .128)	-.044	.001
Step 4									
Child's age	-.034(-.112, .045)	-.038	.001	-.039(-.171, .092)	-.035	.001	-.202 (-.335, -.068)	-.178**	.032
Intention	.108(-.006, .222)	.106	.007	.023(-.169, .214)	.018	< .001	.067(-.127, .260)	.051	.002
PBC	.199(.129, .269)	.351***	.062	.245(.127, .365)	.342***	.059	.189 (-.070, .309)	.263**	.035
Habit strength	.097(.007, .187)	.135*	.009	-.003(-.154, .147)	-.004	< .001	.155(.003, .308)	.171*	.014
Past behaviour	.207(.103, .311)	.254***	.031	.153(-.021, .326)	.149	< .001	-.056 (-.232, .119)	-.055	.001
Intention*habit strength	-.060(-.124, .005)	-.084	.007	.139(.031, .246)	.155*	.023	-.045(-.145, .046)	-.050	.002

*Note.* *N* = 235. *CI* = confidence interval; *PBC* = perceived behavioural control

\*  $p < .050$ , \*\*  $p < .010$ , \*\*\*  $p < .001$

### **Predicting Mother's Healthy Feeding Behaviours**

Child's age did not explain any variance in the general healthy feeding behaviour of the mother or in their perception of their child's fruit and vegetable consumption, adjusted  $R^2 < .002$ ,  $F(1, 232) < .480$ ,  $p > .489$ ,  $f^2 < 0.01$ . However, it did explain a small amount of variance in their perception of their child's unhealthy snacking behaviour, adjusted  $R^2 = .027$ ,  $F(1, 232) = 7.53$ ,  $p = .007$ ,  $f^2 = 0.03$ , such that unhealthy snacking increased as child age increased (Table 4).

### **Predicting Healthy Feeding Behaviours using the Theory of Planned Behaviour**

Intention and perceived behavioural control predicted a total of 47% of variance in general healthy feeding behaviour of mothers at step 2, adjusted  $R^2 = .472$ ,  $F(3, 230) = 70.3$ ,  $p < .001$ ,  $f^2 = 0.92$ ,  $R^2_{\text{change}} = .476$ ,  $p < .001$ . At step 2, only perceived behavioural control and not intention predicted mothers' perception of their child's fruit and vegetable consumption as well as unhealthy snacking behaviour (see Table 4). Perceived behavioural control was positively associated with mothers' perception of their child's fruit and vegetable consumption and with unhealthy snacking behaviour. Both models at step 2 explained 17% of variance in their perception of their child's fruit and vegetable consumption and unhealthy snacking behaviour, both adjusted  $R^2 > .165$ ,  $F > 16.3$ ,  $p < .001$ ,  $f^2 > 0.21$ ,  $R^2_{\text{change}} > .144$ ,  $p < .001$ . This indicates that the theory of planned behaviour is only a good fit for the mother's general healthy feeding behaviour and did not fit their perception of their child's fruit and vegetable consumption or unhealthy snacking behaviour. In the latter two behaviours, only perceived behavioural control predicted the outcome behaviours.

### **Extending the Theory of Planned Behaviour**

In step 3, we extended the theory of planned behaviour with measures of past behaviour and habit strength. Adding these two variables increased variance explained in the mother's

general healthy feeding behaviour, adjusted  $R^2 = .532$ ,  $F(5, 228) = 54.0$ ,  $p < .001$ ,  $f^2 = 1.18$ ,  $R^2_{\text{change}} = .064$ ,  $p < .001$ . However, as Table 4 shows, past behaviour only predicted mothers' healthy feeding behaviour, not habit strength. The model fit did not significantly increase for mothers' perception of their child's fruit and vegetable consumption or unhealthy snacking behaviour, both adjusted  $R^2 < .172$ ,  $F < 7.37$ ,  $p < .001$ ,  $f^2 < 0.23$ ,  $R^2_{\text{change}} < .014$ ,  $p > .138$ . Lastly, the model in step 4 showed that the inclusion of the interaction effect between intention and habit strength only increased model fit in mothers' perception of their child's fruit and vegetable consumption, adjusted  $R^2 = .182$ ,  $F(6, 227) = 9.82$ ,  $p < .001$ ,  $f^2 = 0.21$ ,  $R^2_{\text{change}} = .022$ ,  $p = .012$ . The interaction is plotted in Figure 1.

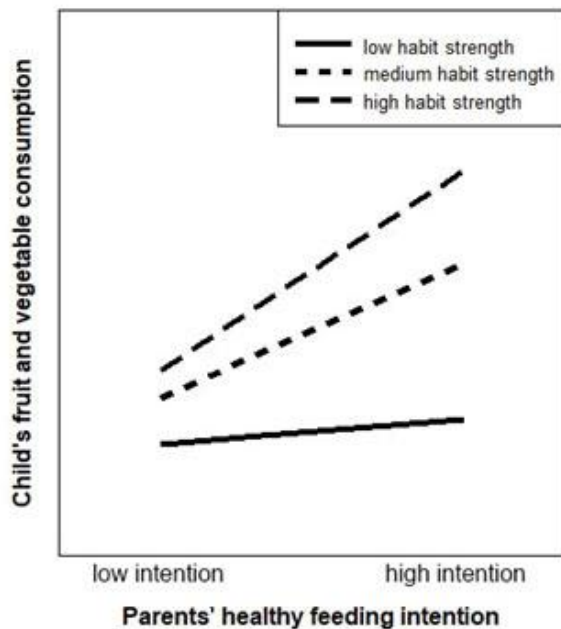


Figure 1. The interaction between intention and habit. The higher on the y-axis the more fruit and vegetables consumed.

The Figure shows that habit strength closes the intention-behaviour relation.

### **Discussion**

The objective of this research was to investigate the predictive utility of the theory of planned behaviour with the addition of past behaviour and habit strength, to explain healthy feeding behaviours of the mothers of preschoolers. Initially it was proposed to explore six behaviours, these were parents' general healthy eating, their perceptions of their child's fruit and vegetable consumption, healthy and unhealthy snacking, and healthy and unhealthy drinking behaviour. However, given there were no bivariate correlations between the predictor variables and three of the outcome variables (healthy snacking and both healthy and unhealthy drinking behaviour) three of the planned regressions were not conducted. This will be discussed further in the limitations below. Thus, three specific healthy feeding behaviours of mothers of preschoolers were tested: (1) parents' general healthy feeding behaviour; (2) their perceptions of their child's consumption of fruit and vegetables; and (3) their perceptions of their child's unhealthy snacking behaviour. The findings for each of these healthy feeding behaviours are discussed below.

As hypothesised, the extended theory of planned behaviour was a good fit for predicting parents' general healthy feeding behaviour. Results revealed that attitude, subjective norm and perceived behavioural control predicted intention, and intention, perceived behavioural control, habit strength and past behaviour were all positively associated with parents' general healthy feeding behaviour, explaining a large 47% of variance. Specifically, mothers with higher levels of intention, higher levels of perceived behavioural control, past behaviour, and stronger habit strength were more likely to engage in healthy feeding practices. This is consistent with previous research in other eating behaviours whereby both rational and automatic processes predict healthy eating (Kothe, Sainsbury, Smith, & Mullan, 2015; Mullan et al., 2016). Few studies have looked at parental feeding behaviours using the theory of planned behaviour in preschoolers in contrast to

the number of studies looking at personal food consumption behaviours (McDermott et al., 2015). Among the studies that have explored parental feeding behaviours using this framework there have been mixed findings. Interestingly, the opposite pattern of results was found when predicting mothers' behaviour of introducing solid food to 6 month old infants, perceived behavioural control was not associated with intention or actual behaviour, however intention was (Hamilton et al., 2012). These studies are important as they help to disentangle the different psychosocial predictors of parents' behaviour at different developmental stages of their children.

Therefore, this has important implications for interventions targeting healthy feeding in this population as it helps intervention designers to more precisely determine what predictors of behaviour to target. Using particular behaviour change techniques that target intention, perceived behavioural control and habit strength such as specific planning and goal setting, instructions on how to perform a behaviour or preparatory behaviours, and the use of prompts/cues, interventions may be able to successfully improve the feeding practices of mothers of preschoolers (Abraham, Kok, Schaalma, & Luszczynska, 2010).

It was also hypothesised that habit strength would moderate the association between intention and parents' general healthy feeding behaviour. Interestingly, this was not the case as intention and habit strength did not significantly interact to predict parents' general healthy feeding indicating that for parents to be able to provide healthy food choices to their children involves both rational and automatic processes. This is in contrast to other eating behaviours whereby stronger habit strength reduces the importance of intention (De Bruijn, 2010), but is comparable to an Australian study on fruit and vegetable consumption (Rompotis, Grove, & Byrne, 2014). This could be because parents' healthy feeding practices are for their children whereas most previous studies have looked at personal eating behaviours. More research into

behaviours for others and the role of habit strength is needed. However, the interaction between habit strength, which is an automatic process, and intention, which is a rational process, is complex. To disentangle their role in predicting individual feeding behaviours that differ in their complexity and time span of acquiring the benefits, future research could use other techniques such as ecological momentary assessment (Stone & Shiffman, 1994).

Mothers' perceived behavioural control predicted preschooler's fruit and vegetable consumption. Specifically, higher perceived behaviour control was associated with greater fruit and vegetable consumption of the child. Unexpectedly and contrary to what we hypothesised, neither intention nor habit strength were associated with behaviour. This is in contrast to personal fruit and vegetable consumption whereby intention and habit strength as well as perceived behavioural control have both been shown to be predictive of behaviour (Mullan et al., 2016). However, habit strength did interact with intention to predict behaviour, such that habit strength closes the intention- behaviour gap as seen in De Bruijn (2010). Given that perceived behavioural control was also important in predicting parents' general healthy feeding behaviour, interventions that target parents control over their healthy feeding behaviours is likely to increase children's fruit and vegetable consumption.

Results indicated that only perceived behavioural control was positively associated with mothers' perceptions of their child's unhealthy snacking behaviour, such that mothers with lower levels of perceived behavioural control were more likely to have preschoolers who consume unhealthy snacks frequently. The importance of perceived behavioural control is interesting given that it is not always the most important predictor of behaviour (Ding, Mullan, & Xavier, 2014). Furthermore, child's age was negatively associated with unhealthy snacking behaviour, indicating that older preschoolers consume unhealthy snacks more frequently than younger preschoolers.

This probably is correlated with the child's growing awareness of food in the environment (i.e., advertising) and the ability of children to voice their desires and is an important avenue for intervention design. Research has shown that advertising of unhealthy food to children is prevalent and appears to impact children's unhealthy eating (Andreyeva, Kelly, & Harris, 2011; Mergelsberg et al., Under Review) suggesting that changing legislation may reduce unhealthy snacking. For example, recently in Chile, legislation has been introduced to effectively manage the impact of advertising on children (Olivares et al., 2017). A recent study found that there was a notable reduction of meeting fruit and vegetable recommendations between 2-3 to 4-5 year old children (Mihirshahi et al., 2019). Some of this may be explained by the increases in the number of serves recommended between these ages. However, it may be the case that the increase of needed nutrients are covered with an increase in unhealthy snacking behaviours instead of healthy fruit and vegetable consumption.

Intention was not associated with behaviour (see limitations below), nor did intention and habit strength interact to predict unhealthy snacking behaviour. This is consistent with previous research examining the predictors of unhealthy snacking (Gardner, Corbridge, & McGowan, 2015), where intention to avoid unhealthy snacks and habitual behaviour were both unique predictors of unhealthy snacking, but did not interact. The implications for this for intervention design relate to targeting parents' beliefs that they are able to manage their children's desires for unhealthy snacks, especially when children become older and likely start to voice their desires for unhealthy snacks.

Overall, our findings imply that perceived behavioural control is the most important predictor of specific healthy feeding behaviours, including mothers' perception of their preschooler's fruit and vegetable consumption and unhealthy snacking behaviour. Whereas



intention, habit strength, and past behaviour were also significant in parents' general healthy feeding behaviour. Interventions targeting healthy eating of preschoolers should primarily focus on building skills, capability and perceived behavioural control to increase parents' healthy feeding behaviours. Numerous theoretical and evidence based methods can be used to achieve this. These are guided practice, wherein parents are prompted to rehearse and repeat the behaviour various times, discuss the experience and provide feedback (Okrentowich, 2006), verbal persuasion or improving physical and emotional states (Okrentowich, 2006), reattribution training, to help parents reattribute their previous failures (Marlatt & Donovan, 2005), self-monitoring (Creer, 2000), providing contingency awards (Bandura, 1990), cue altering (Achtziger, Gollwitzer, & Sheeran, 2008), public commitment (Ajzen, Czasch, & Flood, 2009), goal setting (Latham & Locke, 2007), and planning coping responses (Marlatt & Donovan, 2005). However, it is important that these methods are tailored at the individual level, based on the personal beliefs (Kok et al., 2016) in order to design successful interventions.

A number of limitations exist in this research. The term general healthy eating was used without definition. Whilst this may be a limitation, we chose not to include specific reference to Australian Healthy Eating Guidelines as we felt this would prime parents to respond in a particular way. Future research could consider whether using explicit definitions improves recall and outweighs the risk of social desirability bias. Furthermore, this study design measured behaviour over one week period, which is sufficient to assess associations. However, longer term designs are recommended for future studies since these provide more detailed information. In addition, the sample was self-selected through the use of the parenting and food focussed Facebook groups to recruit participants. A large number of people clicked on the study link but choose not to complete the survey. We are unable to determine reasons for lack of continuing to

complete the survey but speculate lack of interest, lack of time, or ineligibility may be possible reasons. Moreover, our sample consisted of mothers only and, therefore, our results cannot be generalised to fathers' feeding practices. It is recommended that future research finds methods to encourage fathers to participate. Nonetheless, our sample was representative of the general female Australian population and, therefore, can be applied to design interventions that target mothers of preschoolers in Australia and possibly other western countries.

Another limitation is that research using the theory of planned behaviour has focused extensively on the importance of correspondence (Ajzen & Timko, 1986) whereby target, action, context and time need to correspond between measures of intention and measures of behaviour. This was the case in our study for measures of parents' general healthy feeding behaviour and resulted in high correlations. However, using measures of feeding behaviour that have been previously used to look at unhealthy and healthy snacking and sugar sweetened beverage consumption (McGowan et al., 2013) resulted in lower correlations between measures of intention and behaviour. The lack of significant results from healthy snacking and both healthy and unhealthy drinking behaviour may not be attributable to issues with the theory of planned behaviour but may be related to measurement issues and more research is needed to explore this and to determine if research using validated measures can still show significant predictive utility when using the theory of planned behaviour. For example, Churchill, Jessop, and Sparks (2008) used a snacking behaviour measure similar to ours which showed that both perceived behavioural control and intention predicted significant variance in behaviour suggesting that it may not be wholly attributable to lack of correspondence. Further, given that the measure of unhealthy snacking behaviour did show that perceived behavioural control and habit strength predicted a

substantial proportion of variance in behaviour, it suggests the correspondence is less likely to be the issue.

This has important implications for health researchers because validated measures that more accurately capture the behaviour of interest may be more acceptable than general self-report measures. Therefore, it is important that researchers use both validated measures and measures of correspondence to allow for greater understanding of this complex measurement issue. This would also result in greater ecological validity. However, to achieve this in the current study would have involved asking six intention questions (each with two items), each specific to the behaviours of interest. We elected not to do this as we believed it could lead to participant burden and in itself may reduce participation and thus lead to more skewed results. Additionally, validated measures of behaviour have been successfully used before in research adopting the theory of planned behaviour framework, suggesting to us that the issue of correspondence may not be as big an issue as some may believe (Ding, Mullan, & Xavier, 2014). This is an important and current controversy in the field of eating research that transcends health psychology. Despite this limitation we believe the current findings are important as they shed light on issues of measurement and potentially important differences in the predictors of parents' healthy feeding behaviours.

## **Conclusion**

The results of this study provide greater insight into the factors that underlie parental healthy feeding behaviours for their preschool aged children. The different predictors of the different eating behaviours suggest that 'one size does not fit all' when designing interventions to help parents provide healthy options to their preschoolers. Across all behaviours, perceived behavioural control was an important predictor suggesting that parents perceive difficulties in

their ability to engage with their healthy feeding practices. While legislative changes (e.g. sugar sweetened beverage tax) may be effective at changing behaviour, there is often resistance from consumers to these changes (Diepeveen, Ling, Suhrcke, Roland, & Marteau, 2013). Therefore, there is a place for personal interventions targeting behaviour change and, in this case, targeting perceived behavioural control. There are numerous theoretical based methods that can be considered when increasing perceived behavioural control in parents. However, these need to be personalised to be effective in changing parents' beliefs about their control. Future research needs to further investigate the complex relationship between rational and automatic processes in individual feeding behaviours given the different pattern of predictors.

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